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14. ABSTRACT The Department of Defense/Tricare system faces significant challenges in protecting the health of nine million service members, their families, and retirees. At the same time these entities must control costs and monitor, measure, and improve the quality of care provided to its members. Clinical Looking Glass (CLG) provides actionable health care metrics on longitudinal patterns of care generated from a data repository of clinical and administrative information. Implementation of CLG on a "proof-of-concept" data set from the Military Health Service will allow demonstration of its effectiveness as part of the DoD's arsenal of quality of care analysis tools.					
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Introduction

This project significantly advanced the establishment of a proof-of-concept (POC) version of Clinical Looking Glass (CLG) using Protected Health Information (PHI) data for evaluation by Military Health Service (MHS) personnel at Walter Reed National Military Medical Center (WRNMMC). This report describes completed project milestones, scientific advances, and remaining goals for this ongoing effort, which has received additional funding via separate grants.

Body

Objective 1: Identified Data Proof-of-Concept

- a) **Configuration of “Proof of Concept” Clinical Looking Glass Using PHI Data.** The CLG team worked with resources at Air Force Population Health to develop the data structure to be used for the PHI proof-of-concept. Population Health resources are developing extract/transform/load rules for provision of data to the CLG proof-of-concept. The CLG team populated the structure with Montefiore test data and conducted extensive testing of the application. A few technical issues were identified and will be addressed in the next phase of this project.
- b) **Use of PHI Data.** Application for a data use agreement for PHI data in the proof-of-concept was made, including receipt of rulings from the Montefiore and Air Force IRBs and privacy officers.
- c) **Technical access to PHI and CLG proof-of-concept.** Requirements for remote access to the CLG servers to be housed at the SPAWAR data center were defined and requisite hardware and software tools acquired. Testing of this access is underway with some settings changes necessary at SPAWAR.
- d) **Personnel clearance for access to PHI and SPAWAR servers.** While four previously cleared team members have departed the group, new team members have been identified for inclusion on the team supporting this project. They are in the process of completing form SF85 in anticipation of identification of a security officer to process them.
- e) **Research Automated Extract Options:** While the single extract of identified data will serve the evaluative goals of this project, Clinical Looking Glass is of minimal value without continually updated data. Our contacts at Air Force Population Health are preparing repeatable ETL processes to support continual update of the CLG data mart.
- f) **Configure Clinical Looking Glass Application.** CLG version 3.4 is ready to be installed on Air Force servers housed in the Space and Naval Warfare Systems Command (SPAWAR) data center. These servers are expected to be ready in May 2011.

Objective 2: Core Feature Development

- a) **Further Development of Event Canvas.**
 - Common condition definition, reuse, sharing, and management. Users may define commonly needed event scenario (e.g., an admission with a diagnosis of diabetes, a prescription for a specific medication) and reuse them in various parts of the application.
 - Refactor of Time to Event and Quality Duration Calculator modules. The Time to Event module has been refactored as the Time to Outcome method of the new Study Designer module. The Quality

Duration Calculator is expected to be replaced by the new Time in Range method of Study Designer by August, 2011.

- Enhancements to event collection browse functionality. A number of defect fixes were made to this feature. The ability to specify a duration in which to look for a specific outcome event was added. Default browse data categories were reduced to “declutter” user output. Additional derived data elements were added, and the output layout options were enhanced. In addition, the new List method of Study Designer provides enhanced versions of certain key features and will ultimately replace Event Canvas Browse.
 - Expanded data quality monitoring. A data quality tool was acquired and basic quality rules defined. Existing flows were prioritized for analysis and rule application.
 - Unify Business Rules Logic. The new Study Designer module provides a framework into which business/clinical modeling can be incorporated. The re-factor of Time to Event, Quality Duration Calculator, and Event Canvas Browse as methods within Study Designer are the first three modeling options. These methods take advantage of our re-designed analytical engine and new statistical engine.
- b) **Expand Report Offerings.** We continue to expand the subject area coverage of CLG through the creation of ad hoc reports. Reports specific to the WRNMMC community can be created based on user requirements to be gathered during POC evaluation. Reports added to the Montefiore CLG implementation during this project period include:
- Geocoding
 - Laps Score
 - Diabetes Physician Performance.
 - Time Weighted Average
 - Preventive Care and Preventive Care Daily
 - Meaningful Care
 - Continuity of Care
 - PCP Reassignment
- c) **Refine Release Management Process.** The “Proof-of-Concept” implementation of CLG for DoD is supported through formal release management procedures that serve all customers beyond the Montefiore campus. We engaged a vendor to develop automated deployment tools for all of CLG’s suite of applications. The new tool and methodology will be employed at Montefiore with CLG release 4.0 and will be available for subsequent upgrades to the DoD POC.

Objective 3: Scalability and Extensibility

- a) **Scalability.** CLG includes at its core the application of a number of statistical methods to patient cohorts derived from the subject data. We have replaced the existing statistical engine with R-Evolution and tested it with all existing CLG functions. R-Evolution supports parallel processing and much larger data sets than the previously used engine. This integration will be made available to the Montefiore user community with CLG 3.4 in the second quarter of 2011.
- b) **Extensibility:** CLG’s meta data driven data adapter layer has been successfully mapped to the Air Force Population Health-provided data models without the need for code changes.

Key Research Accomplishments

- Establishment of working relationship with Air Force Population Health for both data provision and system hosting
- Successful test of CLG “bolt-on” to MHS PHI data model
- Integration of R-Evolution with CLG
- Development of advanced deployment methodology and technology
- Development of Study Designer, introducing a unified approach to cohort research within CLG

Reportable Outcomes

- Air Force IRB ruling that the CLG proof-of-concept using PHI data does not constitute research
- Montefiore Medical Center IRB ruling that the CLG proof-of-concept using PHI data does not constitute research
- Development of PHI data structure for CLG POC

Conclusion

Notable advances were made toward the implementation of the CLG PHI Proof of Concept for evaluation by MHS personnel. Clear collaborative goals were established between the CLG team and resources provided by Air Force Population Health. Including:

- Definition of the data model for the CLG data mart
- Establishment of responsibility for that mart with Population Health
- Establishment of responsibility for hosting of CLG within the Air Force enclave at the SPAWAR data center
- Favorable Institutional Review Board rulings for the use of PHI data in the CLG proof of concept
- Development of new features critical for MHS users

The completion of these milestones leaves the CLG Proof-of-Concept poised for deployment in the coming months, pending receipt of the data use agreement and security clearances. The project is currently funded through the WRNMMC evaluation period, scheduled to begin in September 2011.

References

None cited.

Appendices

Appendix A -- Team

List of CLG team members whose salaries were partially funded by funds from this grant.

Name	Role on Project	Portion of salary paid by project
Castro, Moises	System Administrator	25.00%
Chowdhury, Soma	Software Engineer	10.00%
D'Angelo, Anthony	Software Engineer	18.00%
Edwards, Richie	QA Engineer	17.00%
Geberer, Noah	Implementation Team Lead	60.00%
Golden, Joe	Database Engineer	15.00%
Gong, Sunny	Software Engineer	10.00%
McCroskey, Mia	Senior Project Manager	29.00%
Muresan, Mircea	App Database Admin	19.00%
Patel, Saurabh	Software Engineer	10.00%
Paul, Lisha	Software Engineer	15.00%
Powers, Ken	ETL Database Admin	16.00%
Srivastava, Navneet	Senior Architect	20.00%
Swamy, Harish	QA Engineer	8.50%
Zappulla, Ron	Database Team Project Manager	50.00%